

AMENDMENTS TO THE CLAIMS

Please amend Claims 1, 2, 9, 16, 22, 28, 35, and 39 as indicated below.

A complete listing of all claims is presented below.

1. (Currently Amended) An early failure detection method for a flash memory system ~~wherein the flash memory~~ that designates a quantity of storage locations as spares locations, the spares locations being assigned for use as alternate storage locations in the event that defects occur, the early failure detection system comprising:

tracking the total quantity of spares locations that are available on multiple memory cards;

evaluating the total quantity of spares locations ~~available for assignment as alternate storage locations~~ to determine if a threshold value has been reached; and

A₁ in the event that the total quantity of spares locations reaches the threshold limit, taking a preemptive action to avert impending failure of the flash memory system.

2. (Currently Amended) A method of determining the usability of a solid-state storage device, wherein the solid-state storage device comprises memory cards with storage locations and with spare storage locations for use in the event a defect occurs ~~in other~~ at least one of the storage locations, the method comprising predicting the usability of the solid-state storage device based on ~~the~~ a total quantity of unused spare storage locations in the device.

3. (Original) The method of claim 2, further comprising assigning a quantity of storage locations within a solid-state storage device to serve as spare storage locations in the event defects occur in the storage locations.

4. (Original) The method of claim 2, wherein the act of predicting the usability of the solid-state storage device comprises determining whether the quantity of unused spare storage locations is less than a predetermined threshold amount.

5. (Original) The method of claim 2, wherein the act of predicting comprises comparing the amount of unused spare storage locations to an original amount of spare storage locations.

6. (Original) The method of claim 2, wherein the act of predicting comprises monitoring the frequency of defects occurring.

7. (Original) The method of claim 2, wherein the act of predicting comprises monitoring the rate of change in the frequency of defects occurring.

8. (Original) The method of claim 2, wherein the act of predicting calculates a currently available amount of spare storage locations as a percentage of an initially available amount of spare storage locations.

9. (Currently Amended) A method of monitoring the life expectancy of a flash memory device, wherein the solid-state storage device comprises spare storage locations for use in the event a defect occurs in other storage locations, the method comprising:

comparing the total number of available spare locations available in an array of flash memory cards with a predetermined threshold; and

performing an action when the total quantity of unused spare storage locations in the array of multiple flash memory cards falls below the predetermined threshold, so as to avoid the consequences of a potential failure of the flash memory.

10. (Original) The method of claim 9, further comprising assigning a quantity of storage locations within a flash memory device to serve as spare storage locations wherein the spare storage locations are used when defects occur in the flash memory device

11. (Original) The method of claim 9, wherein the predetermined threshold is stored in a controller in the flash memory device.

12. (Original) The method of claim 9, wherein the predetermined threshold is stored in a memory array associated with the flash memory device.

13. (Original) The method of claim 9, wherein the predetermined threshold is stored in a host system that stores data in the flash memory device.

14. (Original) The method of claim 9, wherein the predetermined threshold is calculated as a percentage of an initial number of spare storage locations available within the flash memory device.

15. (Original) The method of claim 9, wherein the predetermined threshold is calculated as a percentage of an average number of spare storage locations typically available within a flash memory device similar in memory capacity to the flash memory device.

16. (Currently Amended) A solid-state storage device comprising:
a plurality of storage locations on a plurality of memory cards;
a plurality of spare storage locations on the plurality of memory cards
wherein the spare storage locations are used when defects occur in the storage locations; and

a spare count storage location that stores the number of spare storage locations available in the plurality of memory cards

processor circuitry configured to predict the usability of the solid-state storage device based on the quantity of unused spare storage locations stored in the spare count storage location.

17. (Original) The solid-state storage device of claim 16, wherein the processor circuitry is further configured to send a notification regarding the usability of the solid-state storage device.

18. (Original) The solid-state storage device of claim 16, wherein the processor circuitry is further configured to display the quantity of unused spare storage locations.

19. (Original) The solid-state storage device of claim 16, wherein the processor circuitry is further configured to copy data from some storage locations to other storage locations.

20. (Original) The solid-state storage device of claim 16, wherein the processor circuitry is further configured to automatically enable the addition of supplemental storage locations for use by the solid-state storage device.

21. (Original) The solid-state storage device of claim 16, wherein the processor circuitry is further configured to enable a manual addition of supplemental storage locations for use by the solid-state storage device.

22. (Currently Amended) A flash memory device comprising:
a plurality of storage locations;
a plurality of spare storage locations;
a predetermined threshold value; and
processor circuitry configured to compare the total number of available spare storage locations in the flash memory device with the predetermined threshold, and wherein the processor circuitry is further configured to perform an action when the total quantity of unused spare storage locations falls below the predetermined threshold, so as to avoid the consequences of a potential failure of the flash memory device.

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23. (Original) The flash memory device of claim 22, wherein the flash memory device is a flash memory card.

24. (Original) The flash memory device of claim 22, wherein the flash memory device is a flash memory chip.

25. (Original) The flash memory device of claim 22, wherein the flash memory device is an array of flash memory cards.

26. (Original) The flash memory device of claim 22, wherein storage locations can be dynamically allocated as spare storage locations.

27. (Original) The flash memory device of claim 22, wherein the action performed by the processor circuitry allows for the use of other unused spare storage locations accessible by the flash memory device to serve as supplemental spare storage locations.

28. (Currently Amended) A method of determining the usability of a solid-state storage device, the method comprising:

assigning a quantity of storage locations within a solid-state storage device to serve as spare storage locations wherein such spare storage locations are used when defects occur in the storage locations;

monitoring the number of available spare storage locations in multiple memory cards; and

performing an action when the quantity of unused spare storage locations falls below a desired amount, so as to avoid the consequences of a potential failure of the solid-state storage device.

29. (Original) The method of claim 28, wherein monitoring the number of available spare storage locations takes place within the memory device.

30. (Original) The method of claim 28, wherein monitoring the number of available spare storage locations takes place within a host system that uses the memory device to store data.

31. (Original) The method of claim 28, wherein monitoring the number of available spare storage locations takes place within the controller of the memory device.

32. (Original) The method of claim 28, wherein monitoring the number of available spare storage locations takes place within a peripheral controller.

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33. (Original) The method of claim 28, wherein monitoring the number of available spare storage locations takes place within a bus controller.

34. (Original) The method of claim 28, wherein monitoring the number of available spare storage locations takes place within any processor configured to monitor the memory device.

35. (Currently Amended) ~~An early failure detection system for a digital data storage system that designates a quantity of storage locations as spares locations~~
method of monitoring the life expectancy of a digital data storage system, the digital data storage system comprising a quantity of storage locations that are designated as spares locations, the spares locations being assigned for use as alternate storage locations in the event that defects occur, the early failure detection system method comprising:

evaluating the quantity of spares locations available in multiple memory cards within the digital data storage system for assignment as alternate storage locations to determine if a threshold value has been reached; and

in the event that the quantity of spares locations reaches the threshold limit, taking a preemptive action to avert impending failure of the digital data storage system.

36. (Original) The method of claim 35, wherein evaluating the quantity of spares locations available for assignment is carried out by referring to a counter that is incremented each time a new spares location is used.

37. (Original) The method of claim 35, wherein evaluating the quantity of spares locations available for assignment is carried out by counting all available spares locations at predetermined time intervals.

38. (Original) The method of claim 35, wherein evaluating the quantity of spares locations available for assignment is carried out upon request by a host system 102.

A1 39. (Currently Amended) A system for determining the usability of a solid-state storage device, wherein the solid-state storage device comprises spare storage locations for use in the event a defect occurs in other storage locations, the system comprising:

means for monitoring the number of available spare storage locations in multiple memory cards; and

means for performing an action when the quantity of unused spare storage locations in the multiple memory cards falls below a desired amount, so as to avoid the consequences of a potential failure of the solid-state storage device.

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SUMMARY OF INTERVIEW

Applicant would like to thank Examiner Song for the telephonic interview extended to Applicant's counsel of record, John R. King, on October 15, 2003. During the interview, we discussed differences between the cited references and the invention. In particular, we discussed how the invention tracks the quantity of spares locations available in multiple memory cards.